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Videos that Strengthen Rural Women's Capability to Innovate

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LEARNER-CENTERED VIDEOS can contribute to institutional innovations and social inclusion of the poor. From 1999 to 2002 in the Seed Health Improvement Project, women in rural Bangladesh received hands-on training to improve their seed management. Rice yields increased by 5–15%. The subsequent farmer-to-farmer extension reached 13,000 farmers by the end of 2004.

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Meanwhile, in another project operating with a much smaller budget, we developed and tested four videos using the same seed management practices. Video proved better than farmer-to-farmer extension for conveying new scientific knowledge and local innovations. To test the videos' effectiveness and cultural relevance when scaling up, researchers surveyed 1,252 resource-poor women in 12 districts. New technologies such as manual seed sorting and seed flotation with salt were adopted by 24% and 31%, respectively. More than 70% of the women who had seen the videos improved their seed drying. To deter storage insects, the use of botanicals such as neem increased from 9% to 67%, and 91% of the women learned how to expel air from their storage container. By the end of 2005, the documented number of farmers reached was of the order of 130,000. A conservative estimate of the current gain of the video project is at least 17 times the total investment cost. The poor, who helped develop the seed health technologies and videos, also identified appropriate uptake pathways and took the lead in organizing video shows for other community members.

Key words: agricultural extension, video, creativity, learning, poverty reduction, rice, seed, local innovations, partnerships

Bangladesh has recently become self-sufficient in rice, with a production of 40 million tonnes in 2005, an increase of about 50% over the past 10 years (FAO, 2006). This has mainly been the result of improved varieties, irrigation in the dry season (*boro*)[1] and crop fertilizer management, along with improvements in the traditional monsoon rice crop (*aman*).[2] The dry season rice now accounts for more than 50% of rice production. Its harvesting period, however, can coincide with heavy rains, which has led to a new problem—how to properly dry and store seed during the rainy season? Although agriculture has been mechanized to some extent over the years, scientists have paid little attention to these seed issues (Van Mele & Zakaria, 2005). Currently, 95% of the rice seed is farmer-saved; hence, improved on-farm seed management could directly benefit both household and national economies.

Rice yields often decline after 4–5 years of recycling, in part due to accumulation of seed-borne diseases, weeds, and genetic impurities. The seed gets "tired" and needs renewal. Generally, farmers have a notion that seed needs to be renewed periodically and that improved varieties give a number of benefits, but they often undervalue the maintenance of good seed to enable expression of its genetic potential. The sporadic demand from farmers for new seed, the lack of private rice seed suppliers, and the limited ability of government institutions to ensure timely

[1]Boro is the dominant irrigated winter rice season, which is transplanted during the cold months of December to early February and harvested in April to early June.
[2]Aman is the monsoon season whereby rice is transplanted from July to August and harvested from November to December.

delivery of affordable quality-guaranteed seed to the poorest farmers mitigate against sustainable external supply systems. The basis of demand for quality seed is recognition of its value (Danielsen, Bashar, & Holderness, 2005). So how do we go about demand creation, knowing that densely populated Bangladesh has an estimated 13 million rice farmers?

Inspired by a range of alternative approaches based on community participation such as farmer field schools and local agricultural research committees (Braun, Thiele, & Fernandez, 2000; van de Fliert 1993), researchers interacted with farmers to improve the quality of their farm-saved rice seed through participatory research and technology development (Van Mele & Zakaria, 2005). Experience from this Seed Health Improvement Project (SHIP) showed that when aware of its potential, farmers value good seed and are willing to pay a premium price for it. Besides obtaining a 5–15% yield increase, small-scale seed producers in Bangladesh sold their self-processed seed to other farmers in the village at up to 50% higher than the price of unprocessed seed (Orr, Seema, Arifa, Nabi, & Peter, 2004).

The SHIP project also aimed to some extent at reducing the communication gap between research, extension, and farmers. Following an intensive period of participatory research, the project embarked on farmer-to-farmer extension and reached an additional 13,000 farmers by the end of 2004. However successful face-to-face extension may be, scaling up is costly (Quizon, Feder, & Murgai, 2001) and the number of people reached is rather limited, calling for a closer look at the use of media (Snapp & Heong, 2003).

Inevitably, questions arise about accessibility to media, financial sustainability, and appropriateness of different media for different purposes. When the first steps were taken by the Food and Agriculture Organization of the United Nations (FAO) in the mid-1970s in Peru to use video as a tool to recover, preserve, and reproduce farmers' knowledge, the organization was criticized for using an oversophisticated medium for a rural setting (Ramírez, 1998). As it turned out, the project paved the way for the use of video as a cost-effective tool to support group training. Over the past decades, video has been used extensively in rural development (Besette, 2001; Coldevin & FAO, 2001; Norrish, 1998; Uccellani & Rosales, 1992), even including complex topics such as soil fertility (Protz, 1998). However, considering its huge potential, video is still underexplored as a means of merging scientific with local knowledge to stimulate learning and unlock farmers' creativity.

Over the previous five years, the authors explored the efficiency of incorporating successful approaches from farmer field schools into video. As the focus was on learning rather than on technologies, we refer to our method as learner-centered videos. This paper presents results and insights of two subsequent video projects involving a wide range of actors. The pursuit of complementary resources and a

shared vision is considered crucial, so we start by briefly presenting the various organizations, followed by the video development process and how we tested its effectiveness.

Materials and Methods

Multiple Stakeholders

CABI Bioscience is the scientific division of CAB International (CABI), which has centers across the world, implementing more than 100 projects on sustainable agriculture. The senior author, at the time based at CABI in the United Kingdom, worked since 2001 together with AKM Zakaria in the SHIP project, focusing on participatory research and technology development. In 2002, they jointly developed a first video project for which two years later they received an international award from the International Visual Communication Association in London. In early 2005, the authors initiated a follow-up video project under the Good Seed Initiative (GSI).

The International Rice Research Institute (IRRI) managed the Poverty Elimination Through Rice Research Assistance (PETRRA) project, of which both SHIP (1999–2004) and the first video project (2002–2004) were subprojects. The IRRI Bangladesh office actively steered these projects to ensure gender and poverty were adequately addressed. They also play a facilitating role in the second video project under GSI (2005–2007).

The Africa Rice Center (WARDA), where the senior author currently works, considers scaling-up of rice seed production as one of its major challenges. As the videos help to address these, WARDA is currently translating and testing the Bangladeshi videos in some of its member countries. Preliminary experiences in Africa have helped to crystallize issues dealing with local contexts and global relevance. Perceiving the mutual benefits, WARDA, CABI, and IRRI have supported the senior author to continue backstopping GSI activities in South Asia once a year.

Countrywise Communication, a private company specializing in video and multimedia training for agriculture and rural development, trained a Bangladeshi team in digital video production during two two-week sessions in January and March 2003.

The Rural Development Academy (RDA) at Bogra has a mandate for training and action research. The second author has extensive experience in rice and vegetable seed health and production. He has coordinated the Bangladeshi video projects nationally, including the video production and impact study.

Thengamara Mohila Sabuj Sangha (TMSS) is a national NGO with headquarters in Bogra, about 180 km north of Dhaka. They work with 1.8 million women in 62 out of the 64 districts in Bangladesh. The organization manages income-generating

activities, agriculture, credit, agroforestry, fisheries, and livestock among a number of other programs. They collaborated in both video projects.

The Agricultural Advisory Society (AAS) is a small national NGO that has built strategic alliances with a large number of local NGOs and community-based organizations. AAS has vast experience in rice and vegetable seed production and has been involved in numerous PETRRA subprojects, such as the FARMSEED project (Van Mele, 2005). In 2004, and using their own resources, it showed the seed health videos in more than 40 villages. In 2005, they became a partner in GSI, alongside RDA and TMSS.

Video Development

During the first video project in 2003, we formed two video teams based on organizational and individuals' comparative strengths and motivation. The national organizations involved in the first video project were RDA and TMSS.

To break down communication and adoption barriers with the end users, we researched local knowledge and involved rural women in developing and validating both the technologies and the video scripts. Discovery learning principles were applied to introduce scientific knowledge. Although the video teams adhered to adult education philosophy, neither the filming nor the editing was handed over to the community as in participatory video projects.

Assessing what people know and don't know and understanding their attitudes towards certain practices is a first step in developing an adult learning program. We decided to produce four short training videos on seed spots and sorting, seed flotation, drying, and storage technologies (Table 1). Each became a stand-alone video, lasting about 6–8 minutes, and could be used like a module in a training curriculum.

For the four videos, a total of 42 knowledge, attitude, and practice (KAP) statements or questions were asked, of which 7 were open. We refined them several times for relevance and clarity with about 25 women in 3 different locations in Bogra district. Basanti from TMSS returned from a field visit one day saying: "I had a very difficult time trying to explain to women in the village about seed moisture content. We need to adjust that statement as women talk in terms of seed dryness, not seed moisture." Some statements dealing with seed pathogens or unknown technologies such as manual seed sorting were supported by live samples and short demonstrations.

Once the KAP statements were completed, a benchmark survey in one village with 100 female smallholders helped us finalize the issues to address in the videos. By improving women's understanding of new concepts (the life of pathogens and storage insects like rice moths, evaporation, and ventilation during seed drying, air tightness of storage containers) and stimulating them to experiment, we anticipated

Table 1: Seed Management Practices Presented in Four Video Programs.

	Seed Sorting	Seed Flotation	Drying	Storage
Brief description of technology	Manually remove diseased seed	Add salt or urea to a bucket of water until an egg floats; drop rice seed in the the water and remove the bad ones that will float to the surface	Make a bamboo table or bench for drying rice; it can be quickly moved indoors in case of rain	Paint an earthen pot; fill it with rice seed and do not leave a dead air space; add leaves of neem or *bishkatali*; seal pot and place it off the ground
Learning messages	Spotted and discolored seeds are unhealthy; these cannot be removed by winnowing or seed flotation; seed sorting improves yield	Winnowing does not remove all insect-damaged and partially filled seed	Seeds absorb moisture from soil; wind helps in drying seed; a drying table has many other uses than just drying rice seed	Pots absorb moisture, which paint prevents; completely filled pots are dryer than half empty ones; some kinds of leaves repel storage insects
Local knowledge and innovations	Women have little knowledge about seed-borne pathogens	Women already soak seed in water prior to sowing, flotation with salt or urea is a small modification of existing practice	Drying tables were designed with the full participation of local women and men	Traditionally some people sealed pores of earthen pots with used oil; only a few people use botanicals

SOURCE: Van Mele, Zakaria, & Bentley (2005a)

that women would be motivated to develop their own solutions. The intricacies of developing the videos are described in Van Mele et al. (2005b). The guiding principle of the project is presented in Figure 1.

Testing the Effectiveness

The videos were tested qualitatively and quantitatively in two subsequent projects. Quantitative changes in knowledge, attitude, and practices were measured through a KAP survey before and after the video shows. For each statement, women had the choice of "agree," "don't agree," or "don't know." Showing actual samples or demonstrating new concepts (seed sorting) helped to avoid

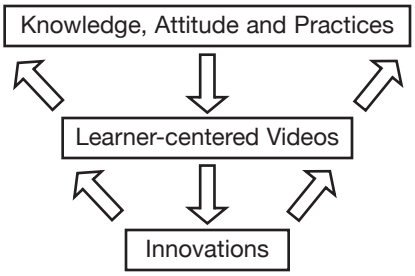

Figure 1. The Video Learning Cycle. Innovations, knowledge and behaviors form the basis for learner-centered videos, which in turn aim to influence these through processes of individual and social learning.

misunderstandings. The development of the KAP statements, as described above, was intricately interwoven with the video script research.

In the first project in 2003, the effectiveness of video-supported group learning was compared with farmer-to-farmer extension. This was done in two separate villages in Bogra district, involving 200 resource-poor women previously identified through well-being analysis. This participatory learning tool stimulates the community to define well-being, set criteria, and classify the households themselves (Islam, Adolph, & Orr, 2004). As we will not present these results in detail, we refer to Van Mele, Zakaria, and Bentley (2005a) for the specifics of this study.

In the second project, as part of the Good Seed Initiative in South Asia, scaling up became a key priority and a detailed action plan with monitoring strategy was developed. Based on experiences from the first project, we revisited the KAP statements and retained 33 out of 49 questions; that is, about eight per video program. Table 2 highlights the adjustments made.

Using the revised statements, a KAP baseline and post-intervention survey was carried out covering 12 districts, 50 villages, and 1,252 women (Table 3). To ensure the impact measured was due to the video intervention, 7 villages were used as control.

The 12 districts chosen corresponded with the partner working areas. In each district, the unions (administrative units) selected practiced double rice cropping. Especially in these systems, seed drying and storage is a major issue. In each union, we randomly selected and visited four villages. Rural Bangladesh is changing fast, with video shops being present in the nearby local markets. So, village access to TV and a video player was not a major selection criterion. However, as the partners had to organize numerous video shows and conduct a baseline and impact survey in a short time, ease of access was a criterion to choosing one out of the four randomly selected villages.

Table 2: Main Changes in Knowledge, Attitude and Practice Statements in Second Video Project (2005), Compared to First One (2003).

Omitted Statements in Second Project	Reason for Omitting
Seed with holes reduce yield	Many refused to answer as they found it too obvious.
Seed with spots reduce yield	Seed-borne diseases are a new concept and a direct link to yield loss is hard to make. As many other factors influence yield loss, some answers were not consistent.
Manual seed sorting reduces weed pressure	The reduction of weed pressure was not a key motivational factor, contrary to what we thought initially.
High seed moisture* increases the germination rate	All disagreed (correctly) even before being trained. Women know very well that seed needs to be stored dry.
Preventing air passing through my container is important	Too obvious. Women who store seed in earthen pots take good care in sealing the lid. They do not know, however, that air can pass through the pores.
Air contains moisture	Quite complex concept and not needed to explain porosity.
Cold temperatures increase the moisture in the air	When earthen pots are placed on the cool floor, condensation takes place and seed at the bottom gets mouldy and spoiled. However, to trigger behavioral change, it was not needed to convey the concept of relative humidity.

*in Bangla, expressed in terms of seed dryness.

Table 3: Characteristics of the Knowledge, Attitude and Practice Survey, 2005.

Partner	Region	District	No. of video villages	No.of control villages	No. of women interviewed
AAS	Northeast	Moulvibazar, Habiganj			
	Northwest, Southwest	Natore, Pabna, Jhenaidah, Magura	15	3	452
RDA	Northwest	Bogra, Sirajganj, Naogaon	14	2	400
TMSS	Northwest	Joypurhat, Gaibandha, Dinajpur	14	2	400

Village maps were drawn and followed up by well-being analyses. The latter is a modified and simplified version of the wealth-ranking exercise described by Pretty, Guijt, Thompson, and Scoones (1995). In each village, 25 resource-poor women were selected on the basis of their poverty status, involvement in rice cultivation, and willingness to take part in the surveys.

The time and location for the video shows were agreed upon in each community. The majority of shows were organized in the courtyard of one of the women, followed by government primary schools, nongovernment primary schools, and nonformal education schools from the country's largest NGO, the Bangladesh Rural Advancement Committee (BRAC).

The baseline survey was conducted in early June 2005. The videos on seed sorting and flotation were shown together throughout June, prior to the *aman* rice-cropping season. The drying and storage videos were also shown jointly in October, prior to *aman* rice harvest. The post-intervention survey was organized in December 2005. Data were entered in spreadsheets and are presented as frequency tables.

During their visits to the villages, the teams also collected qualitative data. They probed for and documented additional local innovations and asked people for feedback on the videos. Suggestions from the audience to further disseminate the videos at no cost were followed up by interviews with a wide range of actors from the public and private sector.

Results

Changing Women's Knowledge and Behavior

The local people already do a fair amount of cleaning seed, mainly through winnowing, but none understood that "sorting" means going through it one grain at a time and removing all spotted and discolored seed (Table 4). To clarify what we meant by seed sorting during the survey, we used a small sample and demonstrated it to the women before asking the question. After seeing the videos, nearly all agreed this practice is needed. When we conducted the post-intervention survey six months later, all of the women were aware of the practice. However, because many of them still perceived manual seed sorting as tedious and time-consuming, only 24% adopted the practice (Figure 2).

When we asked "Do you know what causes spots in the seed?" the majority of women had no idea; they had never distinguished between seed spots and holes and commonly attributed them to bad weather and insects. After the video, nearly all confirmed knowing about seed spots, and about one third of them mentioned diseases.

Before the video, 36% said they practiced seed flotation, but none actually added salt to the water to float out more of the partially filled and insect-damaged

Table 4: Changes in Awareness, Knowledge and Attitude Among Poor Women in 12 Districts in Bangladesh, Pre-test in June 2005, Post-test in December 2005. Results are Presented as Percentage of Women Giving the Target Answer.

	Target Answer	Video (*n* = 1,077)		Control (*n* = 175)	
Survey Question		**Before**	**After**	**Before**	**After**
Have you heard about manual seed sorting?	Yes	0	100.0	3.4	0.0
Seed with spots give weak seedlings	Yes	82.4	99.7	93.7	95.4
Do you know what causes spots in seed?	Yes[1]	37.5	91.4	45.1	42.3
Manual seed sorting is tedious?	No[2]	3.2	12.6	7.4	7.4
Manual seed sorting is needed?	Yes	47.0	96.4	47.4	46.3
Have you heard about seed flotation?	Yes	40.4	100.0	36.0	29.1
Do you know what causes holes in seed?	Yes[1]	79.9	99.4	76.0	69.7
Winnowing removes all seed with holes?	No	65.6	97.8	62.3	64.0
Seed placed on earthen floor can absorb water?	Yes	33.6	98.2	38.3	37.7
Wind can dry seed?	Yes	21.2	97.3	16.6	18.3
Poorly dried seed results in higher insect infestation in storage?	Yes	94.4	100.0	95.4	96.0
Air can pass through earthen pot in other way than via lid?	Yes	9.7	89.3	6.9	8.0
Do you know how to reduce air in storage container?	Yes[3]	4.7	96.0	10.9	8.0

[1]These were followed by open questions.
[2]Actually, it is tedious. The question is intended to ask if people find sorting too tedious to do in spite of its benefits.
[3]This was not a yes-and-no question on the questionnaire, but we have simplified it here.

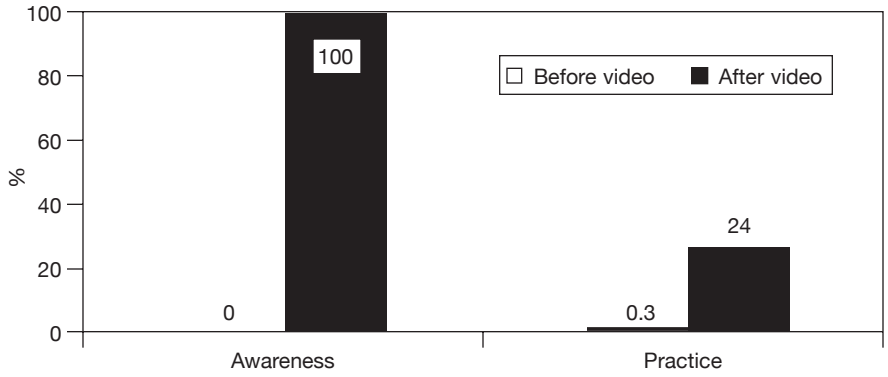

Figure 2. Percentage of resource-poor women in Bangladesh being aware of and practicing manual seed sorting, 2005 (n = 1,077).

seed. Poor women initially thought it was a waste to add salt, as they often cannot even afford to have salt with their meal. After seeing the video, 31% of the women actually added salt in the water (Figure 3).

When we asked "Do you know what causes holes in the seed?" people responded with: insects, poor seed drying, and air in the container. People were well aware that there would be less insect damage if the seed was dried properly and the container was airtight. Their understanding came from experience rather than from learning about insect ecology.

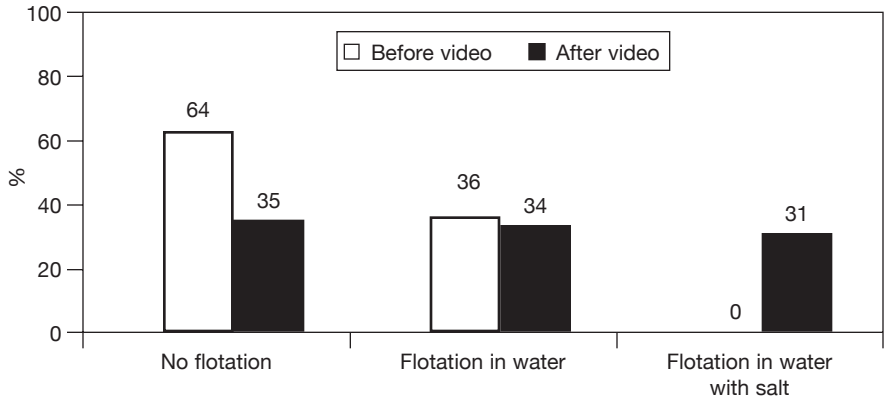

Figure 3. Percentage of resource-poor women in Bangladesh practicing seed flotation prior to sowing, 2005 (n = 1,077).

Overall, learning about seed-borne pathogens and insect storage pests improved women's knowledge but was not the main triggering factor in changing their behavior. Adding motivation was crucial, as will be explained in one of the following sections.

Stimulate Women to Innovate

A different picture emerges from the seed drying and storage videos. Here, learning about new knowledge triggered more behavioral changes. Unlike the seed sorting and flotation ones, which presented new biological concepts, the drying and storage videos allowed for inclusion of local innovations. However, we did not show as broad a range of examples as possible. Rather we visualized underlying principles of moisture absorption, ventilation and air tightness, which previous studies had revealed as key knowledge gaps, and used simple prose and images from daily life. After seeing the videos, nearly all women had grasped these new concepts (Table 4).

The drying video shows how various families decided to construct their own multipurpose seed drying tables, an output from earlier activities with this community (Van Mele & Zakaria, 2005). As the survey was done in the dry season, the need for a drying table was not as high. Nevertheless, almost all women abandoned the practice of drying directly on the ground, using instead a range of surfaces (Figure 4).

People know from experience that airtight seed storage is important, but often do not have the money to buy a plastic or steel drum. Most poor households store their rice seed in jute bags or earthen pots and spend considerable time redrying it every two to six weeks. While watching the storage video, women

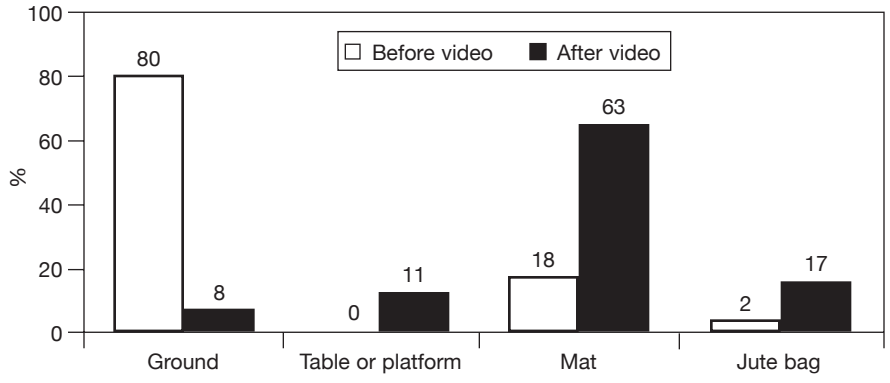

Figure 4. Surfaces on which women in Bangladesh dry their rice seed, 2005 (n = 1,077). Mat includes a wide range of options such as bamboo mats, thatch, and bed sheets.

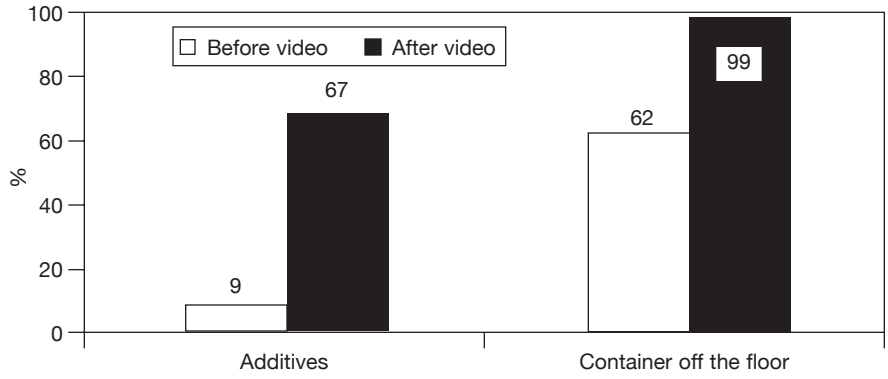

Figure 5. Use of storage additives (botanicals, mainly *neem*) and placement of storage container by women in Bangladesh, 2005 (n = 1,077).

were surprised to learn that earthen pots can absorb moisture through their bottom and sides. Video can present people with a wide range of new concepts to stimulate their creative power. After watching the videos, many tried out different storage pots, mainly smaller and more airtight structures. About 20% painted their earthen pot.

The use of botanicals such as neem (*Azadirachta indica*), bishkatali (*Polygonum hydropiper*) and tobacco leaves (*Nicotiana tabacum*) to deter insects in storage containers increased from 9% to 67%, and placing the seed container high up increased from 62% to 99% (Figure 5).

After learning from the video that padding helps remove air (and moisture) from the rice, nearly all women mentioned sand, rice husk, puffed rice, and ash as means to expel air from the container (Figure 6).

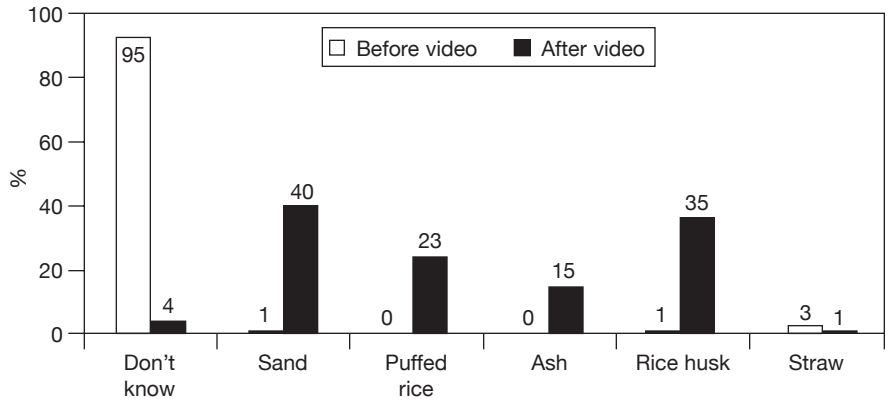

Figure 6. Ways to expel air from seed storage container, 2005 (n = 1,077).

Incorporate New Local Innovations

Project staff learned to be more receptive towards local innovations. After the video shows, staff recorded 45 interesting practices related to rice seed management. Digital photographs accompanied short stories explaining the origin of the idea, the use, and geographical spread of this practice. Of those recorded, 15 had already been covered in the videos. The remaining 30 were presented to a broad multistakeholder workshop in January 2006. Through group discussions, these were scrutinized for suitability to be included in the videos. Our hypothesis was that the more we incorporate relevant local examples, the more the women will be stimulated to innovate. Examples included the use of *nishinda* leaves (*Vitex negundo*) as a botanical insecticide in storage containers, and paint from fruits of wild mangosteen (*Diospyros peregrina*) to make earthen pots airtight. The woody skin of the fruit provides a famous natural paint, commonly used by fishermen on their fishing nets and boats.

Quite a few of the other documented practices dealt with seed management in the field. Some farmers reported creative sound and light devices to control rats and birds during harvest. To reduce labor cost at harvest, farmers of Kalai upazilla under Bogra district press the rice plant with a long bamboo stick to a 45° angle to be able to harvest faster. One farmer mentioned using a polythene-covered threshing table to limit the loss of precious seed during threshing. These will serve as input for a new set of videos dealing with preharvest seed management to complete the cycle from seed-to-seed.

Adding Flavor

Results of changes in seed storage practices indicate that women who had seen the video shows organized by RDA had adopted some different practices compared to the other two groups: various women mentioned using tobacco leaves and naphthalene as seed preservatives, and others reported using ash to reduce the air space in their container. Probing the facilitators, we learned that in a previous project RDA staff had witnessed good results from those particular practices. Hence, they had emphasized these technologies during group discussions following the video shows. Exploring existing subject matter expertise in the system and capitalizing on facilitators' past experiences can add value to video-based learning sessions.

A Worthwhile Investment

In 2003, under the PETRRA project, about 700 copies of the videos were distributed to numerous organizations during a Communication Fair held in Dhaka. Because many NGOs keep detailed records of their activities, we could monitor the number of farmers reached through the organizations. By the end of 2005,

the records indicate more than 1,400 video shows had been organized, reaching about 131,000 poor farmers.

Secondary spin-offs are hard to measure, especially when many organizations are involved. In 2005, under the GSI project, we handed over a video compact disc (VCD) after each show to a person selected by the women in the audience. Interestingly, the women mostly identified a man to look after the CD. Within a very short time, and at no cost to the project, they had organized about 140 more shows for other farmers in their villages. Overall, each CD distributed has triggered changes in the knowledge and practices of about 200 farmers without too much effort. This, of course, only holds if the people who organize the shows are convinced of the direct relevance and quality of the programs.

Up to now, the two video projects combined have cost around $50,000 US, of which the bulk has gone to training the video production team, video equipment and software, developing the videos, and conducting the impact surveys. Even when including all this project expenditure, the cost per farmer trained has come down to $0.38 US, a figure that decreases over time.

With a conservative estimate of 5% yield increase after improving their local seed management practices, and poor farmers owning on average 0.3 hectare, they would get an increase of 54.2 kg (at national yield average of 3.61 tonnes/ha), or $6.4 US extra income per year.[3] The current estimated gain of the video-based training is at least 17 times the investment cost.

Men Want to Know What Women Learn

The videos triggered changes at the household level. Men often watched the videos from the side, and those who could not attend were eager to learn from their women. Obviously, this increase in respect will be more strongly observed through weekly meetings than through a small number of video training sessions. Nevertheless, all women seriously appreciated watching other village women in the videos. This was even observed when women in Africa watched the Bangladeshi videos, opening interesting perspectives for south-south exchange.

Scaling Up and Social Inclusion

How can we reach the poor more quickly? In both our video projects we started by identifying the poor through well-being analysis. This participatory approach allowed us to organize project-funded video shows for relatively small, yet targeted audiences. But to what extent can public funds be mobilized when going to scale? And how does this affect social inclusion?

[3]This was calculated based on the paddy price of 6.75 Taka/kg and at a conversion rate of 100 Taka equals $1.76 US at the time of the project. The national yield average in 2004 was 3.61 tonnes/ha (FAO, 2006). The calculated gain of 17 times the project investment cost is a conservative estimate as poor farmers also lease land.

Further dissemination within the village and to neighboring villages implies certain costs. Running on a small budget, the project was forced to be inventive. Having hardly any money sometimes makes it easier for a project to relate to the poor. After each show, we probed the audience to come up with creative ideas for going to scale at no cost and followed this up through interviews (Table 5).

Some intermediate users were positive because they saw it as their mandate to train or educate people and because they appreciated the rice seed health videos. Others such as tea shop owners and local cable operators hoped to increase their business, and local leaders organized shows to boost their popularity. The women themselves promoted the videos because of their sheer relevance. The efficiency of these uptake pathways, their mobilization of social capital, and effect on social inclusion is part of a separate study.

In early 2006, the national TV committed to further spread the videos under the auspices of the governmental Agricultural Information Services (AIS). They broadcast agricultural information in two ways, namely through the program Mati-o-Manush (40 minutes twice a week) and the repeated day-long telecasting of 3' clips.

Discussion

Learner-centered videos are an interactive medium to document and disseminate local innovations and to convey new scientific concepts. They stimulate farmers to apply new ideas in a creative way and to come forward with their own innovations.

Creating tools to enhance farmer learning is currently considered as a key challenge for scientists (Röling & Jiggins, 1998). Learning about the role of beneficial insects and changing farmers' behavior in rice pest management was possible in Vietnam through a multimedia campaign including leaflets, radio dramas, and posters. The message was limited to one simple rule-of-thumb: do not spray insecticides for leaffolder control in the first 40 days after sowing; and it reached about two million farmers (Heong, Escalada, Huan, & Mai, 1998). Radio was an appropriate medium, because the message addressed a well-known complex of insect pests with highly visible damage symptoms. The defoliating lepidopterous larvae are generally referred to as "worms." Even so, the project opted to develop additional visual support materials.

Apart from our low-cost videos, we did not produce any other materials to re-enforce learning, as suggested for extension campaigns (Adhikarya, 1994). The videos themselves proved highly effective to expose rural communities to a broad range of ideas and innovations, including local ones, and were effective in conveying new concepts that are difficult to express in words, such as seed-borne pathogens. As with the radio drama in Vietnam, the Bangladeshi videos were able to stimulate farmers to engage in experiential learning.

Table 5: Uptake Pathways for Scaling up Videos at No Cost.

Who Indicated	Who Will Show?	Motivation of Actor
Village girls	Secondary boys and girls schools	Many school authorities are convinced about the relevance of the videos and agreed to show them in their agricultural curriculum. They believe that the knowledge will effectively transfer to the farming families through their children.
Male & female farmers	Department of Agricultural Extension (DAE)	During the agriculture and village fairs and many other occasions, the videos can be shown using mobile cinema vans or locally arranged video players. DAE promised to use the videos in their training sessions.
Women farmers	NGOs	Many NGOs are willing to show videos as part of their social development program.
Male farmers and boys	Cooperative societies[1] & village youth clubs	Many societies and clubs have their own TV and VCD player. They want to show videos to update the knowledge of their members and villagers, as it will boost production.
Women & men farmers	Mati-O-Manush (BTV)	In December 2005, the Bangladeshi TV (BTV) authorities agreed to telecast the videos nationwide, because they appreciated their quality.
Male farmers	Tea stall in village markets	If there is electricity supply, at least one tea stall or restaurant in a village market runs videos (movies, songs, religious speeches) day and night. Owners want a copy of the VCD, as they believe it will help to increase their sales.
Village boys & girls	Local cable operators	In between two movies, local cable operators are willing to show videos such as the seed health ones. They believe that if they engage in social work, such as farmer training, their popularity will increase.
Village boys & girls	Village CD shop	To gain popularity, village video shop owners proposed to provide a rent-free rice VCD along with each rented one.
Male & female farmers	Local leaders	In some cases, local leaders rented a VCD player & TV, and ran such programs hoping to increase their popularity.
Women farmers	Women farmer groups	After the shows many women showed a keen interest in organizing video shows, even wanting to pay a small contribution: "The videos are for us, so why should we be reluctant. If we spent one taka, we will earn ten taka."

[1]Cooperative societies are registered under the Ministry of Rural Development and Cooperatives. Each village may have 5–6 different societies, such as women's society, fishermen's society, farmers' society, etc. Generally, they are very active.

Documented successes in the use of mass media are scarce, and farmer-to-farmer extension is still portrayed as one of the strategies having the greatest potential for spurring institutional innovations for agricultural development (Berdegué & Escobar, 2001). Our experience indicates that video is more cost effective and more powerful in triggering behavioral changes than farmer-to-farmer extension. It also helps to avoid quality loss when communicating the learning content. This being said, video does not exclude farmer-to-farmer extension. On the contrary, powerful images stimulate people to share the learning with their neighbors.

It is easily assumed that when local innovations are incorporated in the national extension system, they will be easily disseminated and adopted by farmers. After all, the technologies are appropriate. In Bangladesh, extension agencies have for several years been promoting the use of *neem* and *bishkatali* leaves to deter insects in seed storage (Sillitoe, 2000). In our 2005 survey, less than 10% of the women interviewed used these practices. This went up to 67% after having watched the videos. Video allows for scaling up of local innovations, participatory research, and technology development.

After having seen the videos on seed drying and storage, women not only started experimenting with the newly acquired information, they also came forward more readily with other innovations of their own. Learner-centered videos trigger two-way communication and help to build trust between researchers, change agents, and smallholder farmers.

Most extension agents in developing countries are men, and multiple institutional and organizational bottlenecks exist in training rural women (Jiggins, Samanta, & Olawoye, 1997; Lahai, Goldey, & Jones, 2000). Although the use of radio and video has changed in response to new approaches to development, Norrish (1998) pointed to the danger of creating new exclusion zones, mainly affecting women and children. By giving rural women a voice through video and disseminating the videos through gender-sensitive NGOs and other people active in local communities, these hurdles can be overcome—or at least partly, as the challenges are obviously broader than women and extension. It is one's attitude to women in agriculture that influences how they are included (Paris, Nabi, Salahudden, & Magor, 2005).

To avoid the poor being excluded from the development process, they not only need to be actively involved in the creation of agricultural technologies, but also in shaping the communication tools and strategies (Van Mele & Zakaria, 2005). Incorrectly, video is still often seen as an inappropriate tool in poverty reduction, as illustrated by one of the comments of an anonymous reviewer of our first video proposal: "the [communication] technology appears more sound for literate and intelligent resource-poor farmers." By showing the videos to a group of about 25 poor women previously identified by the community and by letting them decide

on alternative uptake pathways, we were able to reach large parts of the community. This has serious implications for reducing costs of farmer education programs, such as farmer field schools, and ensuring social inclusion of the poor.

From 2002 to 2005, our project expenditure amounted to about $50,000 US, including equipment, capacity building of the video team, and implementing the surveys. Reports from intermediate users indicated that 131,000 farmers were reached directly, and we anticipate that at minimal additional cost, 1 million farmers will be reached by the end of 2006. Considering the decreasing trend in public funding for agricultural research and development (Rivera & Zijp, 2002), the use of video in pro-poor development deserves further attention. In addition, as facilitating partnerships and learning are equally important to successful upscaling, future research needs to assess how to best integrate tools from adult education, communication for development, and innovation systems research. Only in this way, will we be able to obtain larger impacts, faster, and at lower costs.

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